

MSA Test Study Guide

Short Answer

1. a. Which of the following tables represent linear relationships? *Table 2 only*

Table 1

Time (s)	Distance (m)
0	5
1	10
2	12
3	16
4	20

*+5
+2
+4
+4*

Table 2

Distance (km)	Money (\$)
0	0
1	10
2	20
3	30
4	40

*+10
+10
+10
+10*

Table 3

Days	Money (\$)
0	10
1	8
2	6
3	2
4	4

*-2
-2
-4
+2*

b. Write an equation for one of the tables that represents a linear relationship.

Table 2 $y = 10x$

2. Find the value of the indicated variable.

a. Suppose $y = 2x + 10$. Find y if $x = -2$.

*$y = 2(-2) + 10$
 $y = -4 + 10$
 $y = 6$*

b. Suppose $y = 2x - 2.5$. Find x if $y = 10$.

3. Solve each equation to find the value of x .

a. $4x + 10 = 22$

$-10 \quad -10$

$\frac{4x}{4} = \frac{12}{4}$

$x = 3$

b. $3x + 9 = 6x - 6$

$+6 \quad +6$

$3x + 15 = 6x$

$-3x \quad -3x$

$\frac{15}{3} = \frac{3x}{3}$

$5 = x$

$y = 2x - 2.5$

$10 = 2x - 2.5$

$+2.5 \quad +2.5$

$\frac{12.5}{2} = \frac{2x}{2}$

$6.25 = x$

4. Match a table (A–D) with a graph (E–H) and an equation (I–L). List your results below in four groups. For example, on the line for group 1 you should put 3 letters, one for a table, one for a graph and one for an equation which all represent the same linear pattern.

Group 1: Group 2: Group 3: Group 4:
 Table: A Table: B Table: C Table: D
 Graph: F Graph: _____ Graph: J Graph: E
 Equation: K Equation: M Equation: G Equation: L

A.

x	y
-2	-5
-1	-3
0	-1
1	1
2	3

} +2
} +2
} +2

B.

x	y
-2	3
-1	2
0	1
1	0
2	-1

} -1
} -1
} -1

C.

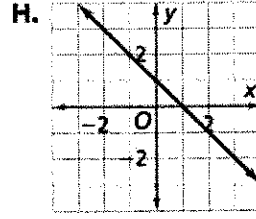
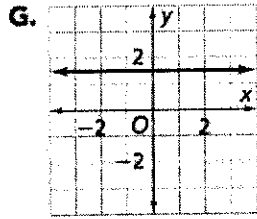
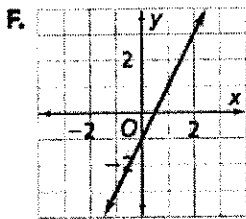
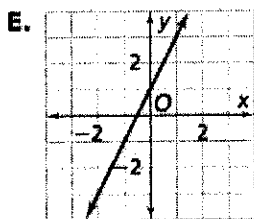
x	y
-2	1.5
-1	1.5
0	1.5
1	1.5
2	1.5

} 0

D.

x	y
-2	-3
-1	-1
0	1
1	3
2	5

} +2
} +2



J. $y = 1.5$

K. $y = 2x - 1$

L. $y = 2x + 1$

M. $y = -x + 1$

5. Given one of the representations below, find the other two.

	I	II	III																												
Table	<table border="1"> <thead> <tr> <th>x</th> <th>y</th> </tr> </thead> <tbody> <tr> <td>-2</td> <td>14</td> </tr> <tr> <td>0</td> <td>8</td> </tr> <tr> <td>1</td> <td>5</td> </tr> <tr> <td>2</td> <td>2</td> </tr> <tr> <td>3</td> <td>-1</td> </tr> </tbody> </table>	x	y	-2	14	0	8	1	5	2	2	3	-1	<table border="1"> <thead> <tr> <th>x</th> <th>y</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>-3</td> </tr> <tr> <td>1</td> <td>1</td> </tr> <tr> <td>2</td> <td>5</td> </tr> </tbody> </table>	x	y	0	-3	1	1	2	5	<table border="1"> <thead> <tr> <th>x</th> <th>y</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>1</td> </tr> <tr> <td>3</td> <td>2</td> </tr> <tr> <td>6</td> <td>3</td> </tr> </tbody> </table>	x	y	0	1	3	2	6	3
x	y																														
-2	14																														
0	8																														
1	5																														
2	2																														
3	-1																														
x	y																														
0	-3																														
1	1																														
2	5																														
x	y																														
0	1																														
3	2																														
6	3																														
Graph	See graph paper		See graph paper																												
Equation	$y = -3x + 8$	$y = 4x - 3$	$y = \frac{1}{3}x + 1$																												

- a. Find the y -intercept for each representation above. I (0, 8) II (0, -3) III (0, 1)
- b. Find the slope for each representation above. I $m = -3$ II $m = 4$ III $m = \frac{1}{3}$

6. Each set of (x, y) coordinates below is generated by a linear rule. For each set of coordinates, write an equation to describe the rule.

- a. $(-1, -7), (0, -3), (1, 1), (2, 5), (4, 13), (5, 17)$
- b. $(-2, 19), (-1, 14), (0, 9), (2, -1), (4, -11), (6, -21)$

a)

x	y
-1	-7
0	-3
1	1
2	5
3	9
4	13
5	17

$y = 4x + 3$

b)

x	y
-2	19
-1	14
0	9
1	4
2	-1
3	-6
4	-11
5	-16
6	-21

$y = -5x + 9$

7. Martin used some rules to generate the following tables:

i.

x	y
-1	6
0	8
1	10
2	12
3	14

ii.

x	y
0	5
3	5
6	5
9	5
12	5

iii.

x	y
-2	-5
-1	-4.5
0	-4
3	-2.5
4	-2
5	-1.5

iv.

x	y
-1	0.5
0	0
1	0.5
2	2
3	4.5
4	8
5	12.5

- a. On grid paper, make a graph of the data in each table. Show the graphs on the same coordinate axes.
- b. Which sets of data represent a linear relationship? How do you know?

* See graph paper

8. Find the number described in each problem by writing and solving an equation.

a. If Sarah subtracts five times her number from 24, she gets 4. What is Sarah's number?

$$24 - 5x = 4$$

b. Twice Bill's number added to 17 is 7. What is Bill's number?

$$\begin{array}{r} x + 17 = 7 \\ -17 \quad -17 \\ \hline 2x = -10 \\ \frac{2x}{2} = \frac{-10}{2} \\ \boxed{x = -5} \end{array}$$

c. The sum of 4 times a number and 14 is 16. What is the number?

$$\begin{array}{r} 4x + 14 = 16 \\ -14 \quad -14 \\ \hline 4x = 2 \\ \frac{4x}{4} = \frac{2}{4} \end{array}$$

$$\boxed{x = \frac{1}{2}}$$

d. If Susan subtracts 11 from one-fourth of her number she gets 11. What is Susan's number?

$$\begin{array}{r} \frac{1}{4}x - 11 = 11 \\ +11 \quad +11 \\ \hline \frac{1}{4}x = 22 \end{array}$$

$$\boxed{x = 88}$$

9. If $y = \frac{2}{3}x + 4$, find y if

a. $x = 0$ $y = 4$

b. $x = 3$ $y = 6$

c. $x = 9$ $y = 10$

d. $x = -9$ $y = -2$

e. $x = 10$ $y = 10\frac{2}{3}$

f. $x = \frac{1}{2}$ $y = 4\frac{1}{3}$

10. Solve the following equations for the value of x :

a. $4x + 10 = 6x - 8$

b. $3(x + 8) = 12$

$$\begin{array}{r} \textcircled{a} \quad 4x + 10 = 6x - 8 \\ -4x \quad -4x \\ \hline 10 = 2x - 8 \\ +8 \quad +8 \\ \hline 18 = 2x \\ \frac{18}{2} = \frac{2x}{2} \\ \boxed{9 = x} \end{array}$$

$$\begin{array}{r} \textcircled{b} \quad 3(x + 8) = 12 \\ 3x + 24 = 12 \\ -24 \quad -24 \\ \hline 3x = -12 \\ \frac{3x}{3} = \frac{-12}{3} \\ \boxed{x = -4} \end{array}$$

11. Each table in i-v below represents a linear relationship. Do parts (a)-(c) for each table.

- Find the slope of the line that represents the relationship.
- Find the y-intercept for the graph of the relationship.
- Determine which of the following equations represents the relationship.

$y = 3 - 4x, y = x + 6, y = 4x - 3, y = 3x - 1.5, y = 2.5x$

i.

x	y
0	0
1	2.5
2	5
3	7.5
4	10

 slope \downarrow
y-int \leftarrow $y = 2.5x$

ii.

x	y
0	6
1	7
2	8
3	9
4	10

 slope \downarrow
y-int \leftarrow $y = 1x + 6$

iii.

x	y
0	-1.5
1	1.5
2	4.5
3	7.5
4	10.5

 slope \downarrow
y-int \leftarrow $y = 3x - 1.5$

iv.

x	y
0	3
1	-1
2	-5
3	-9
4	-13

 slope \downarrow
y-int \leftarrow $y = -4x + 3$

v.

x	y
1	1
2	5
3	9
4	13
5	17

 slope \downarrow
y-int $\leftarrow (0, -3)$
 $y = 4x - 3$

12. In (a) - (f), write an equation for the line that satisfies the given conditions.

- The slope is 7 and the y-intercept is -2. $y = 7x - 2$
- The slope is 0 and the y-intercept is 9.18. $y = 9.18$
- The line passes through the points (3, 1) and (6, 4). $y = 1x - 2$
- The line passes through the points (-24, -11) and (-8, -3). $y = \frac{1}{2}x + 1$
- The line passes through the points (-4.5, 2) and (6.3, 5.8). *challenge* $y = \frac{19}{54}x + \frac{43}{12}$
- The slope is $-\frac{2}{3}$ and the line passes through the point (5, 0). $y = -\frac{2}{3}x + \frac{10}{3}$

$(-8, -3)$
 $(-24, -11)$
 $\frac{-3 - (-11)}{-8 - (-24)} = \frac{8}{16} = \frac{1}{2}$
or $\frac{1}{2}$

$\begin{matrix} 0 & -2 \\ 1 & -1 \\ 2 & 0 \end{matrix} \rightarrow \frac{1-4}{3-6} = \frac{-3}{-3} = 1$

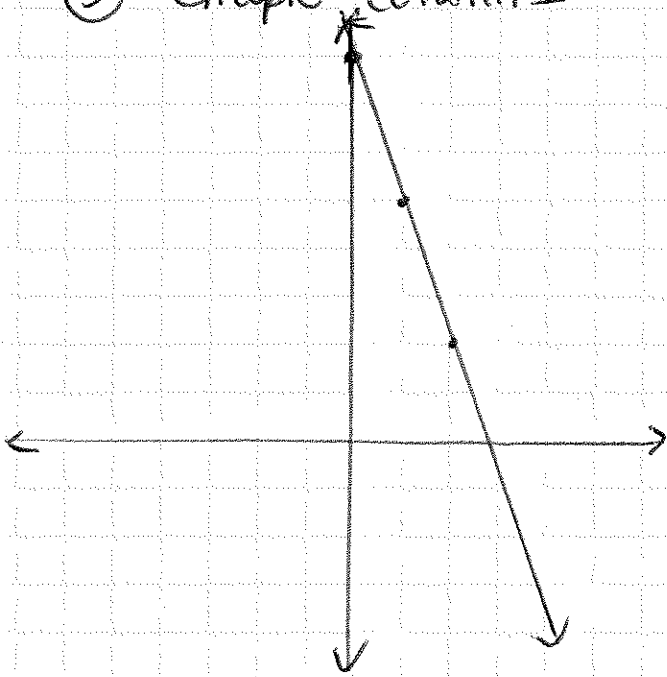
13. Line A is the graph of this equation: $y = 2x + 2$

Line B is the graph of this equation: $y = 2x$

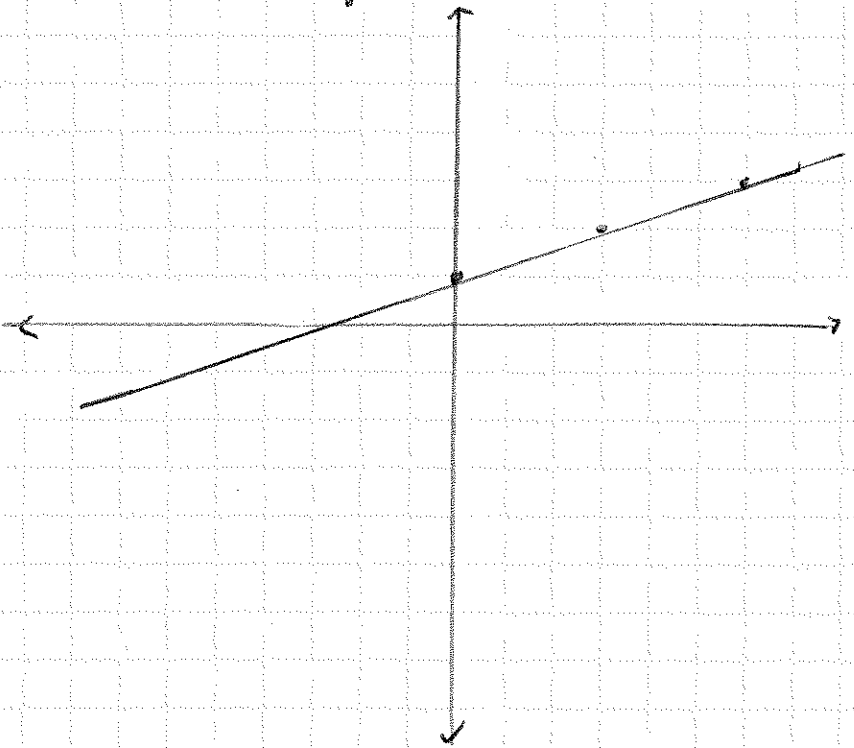
- What is alike about these lines? What is different? *same slope, different y-int*
- Write the equation of a line that lies between line A and line B. How is your equation similar to the equations above? How is it different? $y = 2x + 1$
- Explain why your equation is correct.

parallel & y-intercept is between 0 and 2

⑤ Graph Column 1

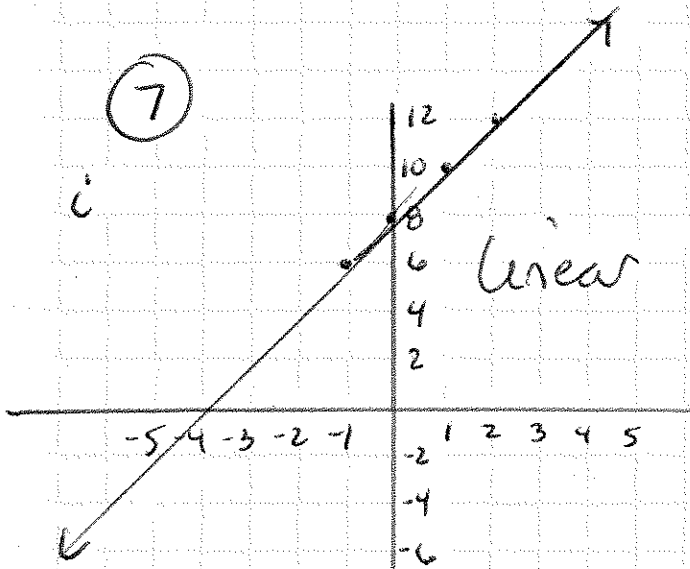


Graph Column 3

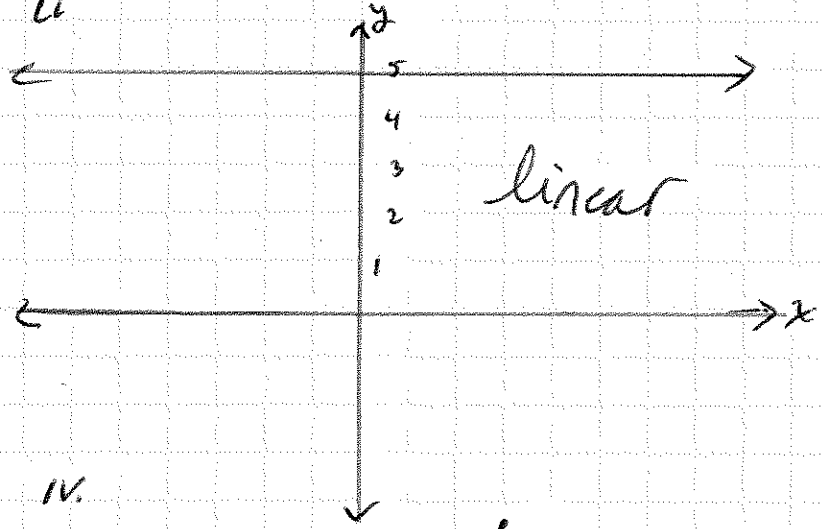


⑦

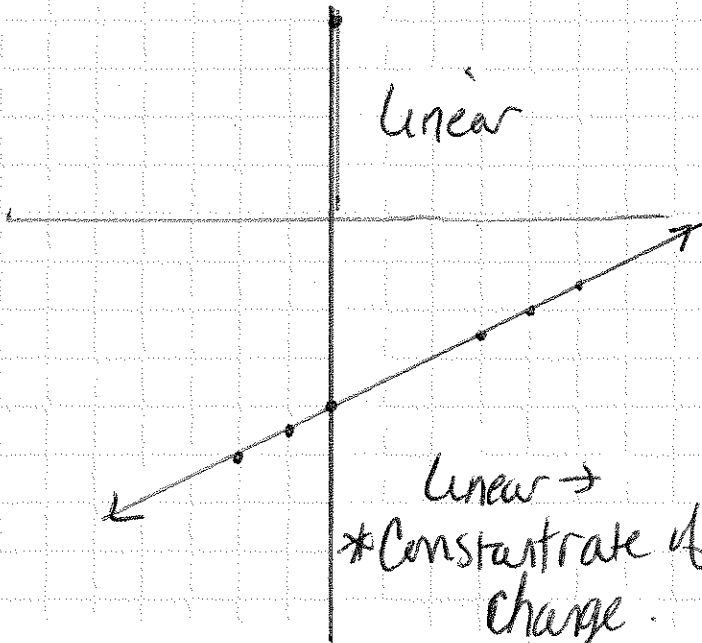
i



ii



iii



iv

